# MICROBIAL PROBIOTICS – THE ACTION MECHANISM AND THE USE OF THEM

**Rita GOLBAN**
The State Agrarian University of Moldova
golbanrita@gmail.com

***Abstract***

*The scientific paper presents important aspects of the mechanism of action and use of probiotic microorganisms, which administered in adequate quantities has beneficial effects on the host. The investigation has the main objective to present an analysis of the importance of probiotics performance and functionality, which are available in food or as nutritional supplements, most frequently represented by strains of Lactobacillus, Bifidobacterium and Streptococcus. The research focused on the activity of the probiotic action as enhanced or concentrated cultures of lactic acid bacteria, which serve not only to prevent or reestablish a malfunctioning of the digestive tract, but have a positive influence on the immune system.*

***Key words:*** *Probiotics, Bacteriocins, Immune system, Metabolism, Probiotic bacteria.*

## Introduction

Probiotics are benefic bacteria having an important role for our health. They are present everywhere: inside and on the body surface, making good things happen, but mostly probiotics are found in bowels. Some of these microorganisms Lactobacillus acidophilus, Bifidobacteria, Bifidobacterium longum, Escherichia coli etc are very important [3],[1].

Although it seems hard to believe, inside of the human and animal body there is a heavy fight every day. Probiotics form a psyhical protective layer along the walls of the intestines in order to protect from the invasion of harmful bacteria [2].

Probiotics constitute 60% from the immune function secreting substances which combat pathogens like: bacteria, viruses and fungi maintaining the body healthy. Besides contributing to the immune system, probiotics have also other important functions which influence positively the organism [4], [6].

The lack of a sufficient quantity of benefic bacteria weakens the immune system and we are exposed to microbes, harmful bacteria and viruses which can cause different diseases. When the digestive tract is healthy, the positive bacteria filter and eliminate everything that can harm – toxins, harmful substances and other residual products. In the same time, tey absorb everything the body needs (nutrients from food and water), assimilates them and distributes them at the cell level [5].

Most probiotics colonize in the intestine. These organisms form a neutral network, sometimes being called as the „second brain". This neutral network from the intestines captures information from the external environment and maintain a constant communication with the first brain through the central nervous system contributing in decision making based on so called intuituin [7,8].

From this point of view, the main objective of this research is represented by the study of some microbiological aspects on how to act and to use probiotics, which are important products in immune potentiation of the animal and human organism.

## Material and method

For the realization of this study there were performed bacteriological investigations of some probiotic species of bacteria: Lactococcus cremoris, Lactobacillus acidophilus, Streptococcus lactis etc.

The investigations have been subjected to microbiological conduct of investigation which consisted in visualization of development characters of microbial cultures and studying the microbial colonies (edges, color, consistency), the development character of cultures in the liquid medium through visualization the development characteristics (turbidity, sediment, consistency, smell, etc)

**Results and discussions**

The detailed analysis of the performed researches gave us the possibility to state and analyze the probiotics effects based on the bacterial studied species through the activity of the action mode and other characteristics which are very complex.

According to the performed studies on probiotic microbial species traded on the world market, these species present a special interest and perform their activity through a complex of benefic effects on the organism (table 1).

**Table 1.**

Probiotic products produced from microorganisms traded on the world market

| **Product** | **Contains** | **Animal species** | **Effects** |
|---|---|---|---|
| All-Lacc | Lactobacili | Piglets | Reduces mortality, increases daily average gain |
| Lacto-Sacc | Lactobacili Saccharomyces | Pigs | Reduces the incidence of diarrhea and mortality |
| Fralac-Lbc | Streptococcus faecium | Allspecies | Prophylactic for diarrhea, growth promoter |
| Cocbactin | Lactobacillus acidophilus | Calves | Increases daily average growth |
| Oralin | Entrococcus faecium | Taurine Swine Poultry | Improves productive performance |
| Protexin | Streptococcus faecium, Steptococcus thermophilus, Lactobacillus acidophilus, Lactobacillus plantarum, Lactobacillus bulgaricus, Lactobacillus casei. | Horses, sheep, pigs | ÎImproves health and productive performance |
| Probios | Lactobacillus acidophilus, Lactobacillus pantarum, Lactobacillus casei | Calves Swine | Increases appetite, milk production, reduces mortality |

Many researches studied the action of probiotics as selected cultures or concentrated of lactic bacteria, which serve not only for prevention or restore a malfunction of the digestive system, but also have a positive influence on the immune system.

Thus the production of inteferon and immunoglobuline may increase very significantly by using probiotics regularly, this fact increases the resistance to diseases and promise the establishement of a normal state.

Therefore, in order to exercise the role of maintaining the microbiota balance, protecting the host organism against various diseases, in order to improve the nutritional status of the individuals

who have consumed probiotics, it is necessary to consider the following: the microbiota strain must withstand (salivary, stomach, intestinal), have good resistance to acid pH of the stomach, survive in large numbers when passing through the stomach, have resistance to action of bile acids, organic acids and lysosome, produce a sufficient amount of organic acids and decreased intestinal pH so as to prevent the development of pathogens and their toxinogenesis respectively.

Important aspects reveal colon colonization and adhesion to intestinal tract epithelial cells, the ability to assimilate cholesterol and hydrolyze lactose, proliferate in vivo in conditions of antagonism with putrefactive and pathogenic bacteria, resistance in technology process to obtain products harvested as probiotics

The current researches on the mode of action of probiotics has focused on the importance of bacteriocins characterized as low molecular weight peptides produced by some bacteria that exert a bactericidal effect on other bacterial species. Bacteriocins have an important practical applicability in preserving food, but also in preventing bacterial infections. They have a restricted inhibition spectrum, acting especially on Gram-positive bacteria, but many bacteriocins produced by lactic bacteria are active against food pathogens such as; Bacillus cereus, Clostridium botulinum, Clostridium perfrin ges, Listeria monocytogenes, Staphylococcus aureus etc.

Most of the bacteriocins produced by lactic acid bacteria are thermoset, thereby maintaining the activity after the heat storage of food processes. Until now, the niche produced by Lactococcus lactis subsp. lactis is the only bacteriocin approved for use in the food industry.

**Table 2.**

Characteristics of the main probiotic bacteria used in fermented milk products

| **Genus** | **Species** | **Optimum temperature (°C)** | **Main final products** | **Secondary final products** |
|---|---|---|---|---|
| Streptococcus | S. thermophillus | 40-44 | L (+) lactic acid | Acetaldehyde, acetone, acetone, diacetyl |
| Lactobacillus | L. bulgaricus | 40-44 | D (-) lactic acid | Acetaldehyde, acetone, acetone, diacetyl |
| | L. helveticus | | DL lactic acid | Acetaldehyde, acetic acid, diacetyl |
| | L. lactis | | D (-)lactic acid | Acetaldehyde, acetic acid, diacetyl |
| | L.acidophillus | | DL lactic acid | Acetaldehyde |
| | L. casei | 25-30 | L (+)lactic acid | Acetic acid |
| | L. kefir | | DL lactic acid | Acetic acid, acetaldehyde, ethanol, CO2 |
| Bifidobacterium | B. breve | 35-38 | L (+)lactic acid,acetic acid | Formic acid, succinic acid, acetaldehyde, acetone, acetoine, diacetyl |
| | B. bifidum | | | |
| | B. longum | | | |
| | B. infantis | | | |

Of a particular interest for researchers is the anti-inflammatory action of lactobacilli on immunomodulatory effects. Therefore, the most studied strains of lactobacilli in terms of supporting the immune system are of particular interest (by stimulating the production of antibodies

in the case of infections) and non-specific (by stimulation of phagocytosis, one of the most important mechanisms of defense of the body, the most important phagocytic cells being leucocytes).

A laboratory study (Argentina, 2011) demonstrated the action of lactobacilli on the mucosal immune system and its contribution to the prevention of intestinal and respiratory infections. Administration of these lactobacilli in both children and adults reduces both the frequency and duration of infectious diarrheal episodes, particularly those caused by Rotavirus, as well as in various enterococcal gastrointestinal infections. The mechanisms of action of bacteriocins are diverse and complex due to their particular chemical structure, in most cases acting on the cell membrane through pore formation or at the level of essential cell processes (transcription, translation, replication, biosynthesis of cell wall components).

In this context, based on the presented analyzes, we mention the importance of the performance and functionality of probiotics - mixed or individual cultures of live and non-pathogenic microorganisms, available in food or as nutritional supplements most frequently represented by strains of Lactobacillus, Bifidobacterium and Streptococcus. Simultaneously, starting from the idea that dairy products are an ideal carrier of live bacteria in the organism, we appreciate the correlation between the probiotics functionality and activity with the functionality of dairy products and the maintenance of the probiotics viability.

**Conclusions**

The activity of probiotics as selected or concentrated lactic bacteria cultures serve to prevent or restore digestive dysfunction and have a positive influence on the immune system.

1. Evaluation of the use of probiotics in various human and animal diseases are relevant characteristic effects by inhibiting the growth of pathogenic microorganisms and increasing the immune response.
2. The use of probiotics represents an additional alternative for increasing and maintaining the health of the human and animal body, implicitly the quality of life.

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